Short Range Missile Tracking Sysytem

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Abstract: Today in the twenty first century the Missile technology is rapidly developing with the advancement of the science. In today's world all types of missiles uses the principle of combustion for its movement. So, until the new technology initiates the tracking of the missile is possible. These missiles can be tracked with the help of Radar, microwave sensing, etc… These equipments are highly advanced and too costly for every developing country to purchase and implement it for there safety. In order to make its design simple, easy to install and to achieve its efficiency, keeping this in background the project has been designed in such a manner that the Missile is detected using an IR at cheaper cost. So this will make the proposed system to be an economical, portable and low maintenance solution for tracking a missile.

Index Terms: IR sensor, Processing Controller, motor controller, Inductor coil

1. INTRODUCTION

A plane or a unrecognized object by is sensed by the radar upto a certain limit. The thought achieves the same results by the robotic action automatically for possible application in military and industrial usage. Till date missile or plane are using combustion of fuel for propulsion. The fire that accompanies the chemical action does produce heat is infrared radiation. So if the IR is sensed the objective can be achieved.

Hence the system comprised of:

1. An IR sensor section
2. A processing controller
3. A Movement controller or Motor controller

With the target continuously producing IR signal system specification drawn:

1. Three IR beam sensor to detect IR beam from the targeting each horizontal and vertical plane
2. The signal level is continuously produced 0 and 1 level.
3. The deciding capability of program in microcontroller is used to calculate, produce and stop motor driving signal with direction.
4. Motor to be used are 12V DC motor and to drive them a driver circuit is used.
5. The circuit may use about 500mA

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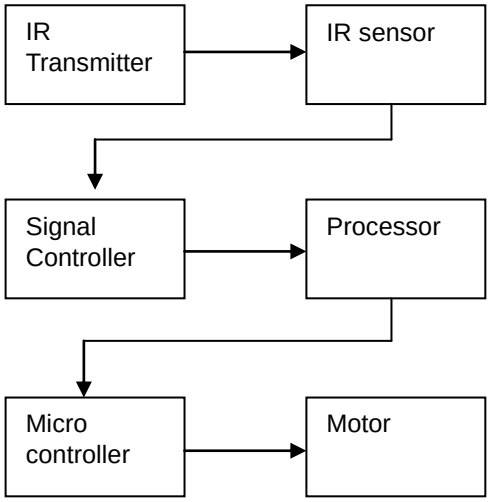
2. COMPONENTS

1. IC 555 wired as Astable Multivibrator for producing continuously approximately 38KHz wave to drive IR led.
2. IC CD4093 as 2 input nand Schmitt Trigger.
3. IC 89C2051 as Microcontroller with 2 input output ports and 2K flash memory to hold program. Can use 12MHz Crystal Clock.
4. L293 Motor driver capable of driving two 12V DC motor fwd, reverse signals control direction.
5. As we plan to use 12V DC motors to maintain its direction in case say the mot starts to rotate the sensor mechanism will try to bring it back.
6. A phototransistor L14F1 is used

2.1 PROCESS TO GO ABOUT

1. Construct and Test Astable Multivibrator using 555.
2. Drive IR LEDs using the output of 555.
3. Try a photo transistor, use detected output to condition schmitt trigger use the conditioned output to triggering a 555 Monostable.
4. Make three receivers as above.
5. Wire the inputs to a microcontroller evaluation board.
6. Construct vertical and horizontal turnable mechnism using dc motors.
7. Drive the dc motors by motor driver ICs.
8. Test movements of motors by conditioning signals.
9. Attach the 3 sensors and horizontal motor write program referring to the table above and check horizontal rotations.
10. Repeat above for vertical sensing and rotation.

3. BLOCK DIAGRAM



The Block diagram is formed with a welformed assumption that our system is initially pointing in general direction of target and the system is to take over from here and change the orientation as target changes. The three horizontal and the vertical IR sensors continuously receive the approximate 38KHz IR beam .The signal strength depends on the direction and his analog ,to convert it into digital ,we will use signal conditioner in the form of a Schmitt trigger. This sensed IR beam is then passed to the microcontroller via IC 555 . The IC 555 also helps to indicate the signals on the LEDs which are placed in a slant position on the top of IC 555.The controller is programmed in such a way that, immediately after receiving the signal it sends it to the motor driver controller. There are two motors (horizontal and vertical) attached to the motor driver controller. These motors are capable of moving in all directions(360°). This makes the motors to move in the same direction in which the “Target” moves. Thus the target is detected & tracked.

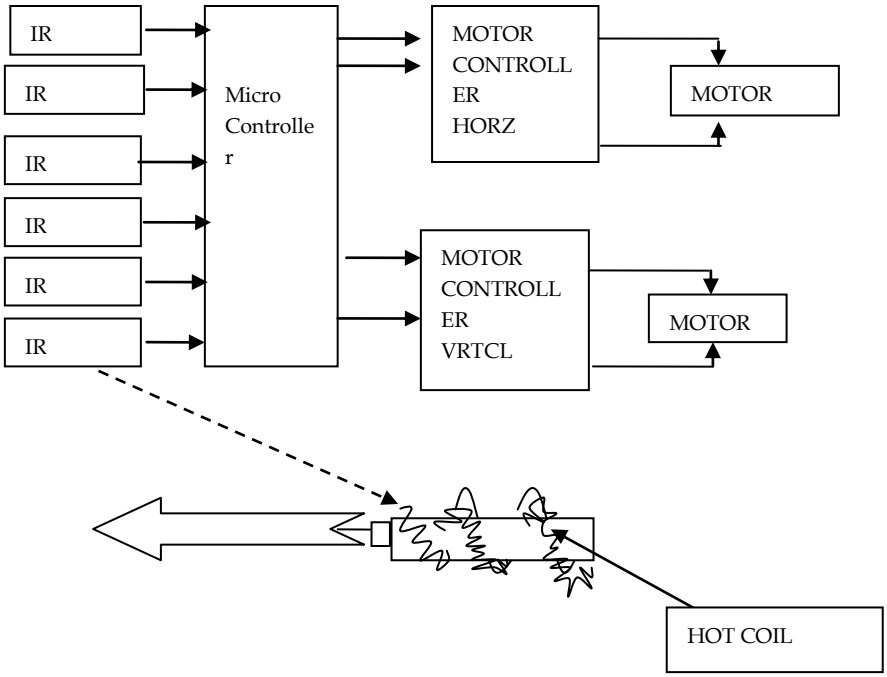
4. SYSTEM MODEL

4.1 DESCRIPTION

The block diagram is formed with a well formed assumption that our system is initially pointing in the general direction of target, and the system is to take over from here and change the orientation as the target changes The three horizontal and the three vertical IR sensors continuously receive the approximate 38 KHz IR beam. The signal strength depends on the direction and is analog, to convert it into digital, using signal conditioner in the form of schmitt trigger. In addition to IR pulses, we use actual fuse lag of missile with burning the engine.deviation of our device from course with reference to target being chased is depicted on a simple led matrix panel. it is possible but we will not implement it to transmit all above data to ground station (it is involved so not impemented it is illegal as well). The digital signals are presented to microcontroller; the program flashed into the controller will perform following actions-

4.2Sensors

TOP	CENTER	BOTTOM	MOTOR VERTICAL
0	0	0	FWD SEARCHING FOR IR BEAM
0	0	1	FWD[R]
0	1	0	STOP OR NO ROTATION ALIGNED
0	1	1	FWD
1	0	0	REV
1	0	1	CANNOT ARISE
1	1	0	REV
1	1	1	ALLIGNED



NOTE – HOT COIL IS A INFRARED OBJECT BECAUSE INFRARED IS ALSO HEAT

DESCRIPTION OF THE SYSTEM

The Basic block diagram of the short range missile tracking system is shown in the diagram on the last page. Mainly it consist of the following essential blocks:

1. Power Supply
2. IR sensor Section
3. 89C51 Microcontroller Section
4. Motor Driver Section

[1]. POWER SUPPLY – The power supply system consist of 12v and the 5v supply. The 12v power supply is given to the 12v dc motor whereas the 5v is given to the microcontroller section.

[2]. IR SENSOR SECTION – The IR transistor will sense the heat and the output of the transistor will become low which is given to the TIMER IC 555

[3]. 89C51 MICROCONTROLLER SECTION - The output from an array of three receivers left, mid and right of any arm is presented to port 1 of microcontroller 89c51 via pins of buffer IC hct245, after inverting by Schmitt trigger IC CD 4093. The program takes care of these changes and produces drive signal on port 0 p0.4 for forward, P0.5 for reverse for horizontal motor and p0.6 forward and p0.7 for reverse vertical motor via l293 motor driver. The output are from pin 3 and pin 6 of l293 for forward, reverses for backarm motor. Pin 11 and pin14 of l293 for forward and reverse of fore arm motor.

[4]. MOTOR DRIVER SECTION – With the inputs given to the microcontroller the motor driver gets the signals and with that signals the motors are working

5. WORKING

The circuit consists of:

1. Ir beam transmitted either from our ir circuit transmitted from heated coil
2. Two sets if 3 ir receivers left.mid and right and the others et top mid and bottom placed in front nose tip

[1]. Ir transmitters:

A 555ne 8 pin ic is wired as astable multivibrator with ra=820e between vcc and pin 7,rb=820e between pin 7 & 6 and a charging capacitor .01 microfarad returned to ground.the output of astable 555 circuit is drawn from pin 3 and is injected as signal to darlington pair of transistors at base via a .1 mfd polyster capacitor.the transistors bc549 are biased in active region by 100k resistors. The collector current drives two ir leds in series ,enhancing the beam strength. thus the beam is generated continuously.

ALTERNATIVELY IR BEAM IS EMMITED FRO A 1KW HEADED COIL

[2]. The Ir receiver sensor:

The Ir receiver is a photo transistor l14f1, from collector load resistance of 6k8 the output of which is made to trigger a 555 monostable at pin 2. Ir signal received imply l14f1 conducts that is pin of 555 goes low that means monostable starts making pin 3 high for duration t=rc =100k x 10mfd= 1sec.

[3]. The microcontroller:
The out put from an array of three receivers' left, mid and right of any arm is presented to port 1 of microcontroller 89c51 via pins of buffer ic hct245, after inverting by Schmitt trigger ic cd 4093 The program takes care of these changes and produces drive signal on port 0 p0.4 for forward,p0.5 for reverse for horizontal motor and p0.6 forward and p0.7 for reverse vertical motor via l293 motor driver. The output are from pin 3 and pin 6 of l293 for forward, reverse for back arm motor .pin 11 and pin14 of l293 for forward and reverse of fore arm motor.

[4]. 89C51 Microcontroller Description
The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4Kbytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard

MCS-51 instruction set and pin out.
The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

6. SCOPE AND EXISTENCE

Advantages:

1. Our system is very simple.
2. Cost effective.
3. Fairly accurate in relatively slow movements.
4. Since line of site detection is used results are more reliable.

Similar systems:

1. Military all over the world have been using the technique of missile hommimg on enemy plane on the heat emitted by the engine after world war 2 the are using heat sensors.
2. On the basis of radar detection guns have been automatically trained on enemy aircraft.
3. By replacing ir with laser beam,a missile fitted similar to our system is being used by modern artillery.

7. Future Developments

1. The range of our system can be increased by making ir beam more powerful.
2. Our system principle can be easily used to detect and home on hiding terrorists, who must be producing heat.
3. By attaching our system to a slow moving vehicle.
4. By processing the IR sensor data by using digital signal processors and algorithms a night vision or incidents occured few hrs before may be 'viewed' by scanning a area.
5. The sensitivity can be improved by using code-modulating like in TV remotes.

7.1 OVERALL ANALYASIS

The analysis of the system helps to establish the feasibility from different angles. The system should satisfy the Technical, Economic and Operational Feasibility.

[1].Technical Analysis:
The Hardware & Software which was used to develop this project was technically feasible to requirements of the user, thus avoiding any software or hardware conflicts.

[2]. Economic Analysis:
The is economically feasible because it uses the common software package FRONT END mod which is feasible in functioning, cost, & which meets the user requirements.

8. CONCLUSION

This paper presents a brief review of how a missile can be tracked and destroyed, using low maintenance raw materials and which is economical for any country to develop it Thus a missile can be tracked and destroyed before it causes harm to our country.

9. REFERENCES

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