Automatic Aircraft Parking Systems

Dr. R. Prema¹, K. Subramanian², B. Senthilvel³

¹Associate Professor, Department of Electronics and Communication Systems, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, India
²Assistant Professor, Department of Electronics and Communication Systems, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, India
³Student, Department of Electronics and Communication Systems, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, India

ABSTRACT

Nowadays technology is moving toward automation which reduces need for human in the production of goods and services, hence which reduces the human related errors and increases the efficiency of work. In the paper LDR sensor based Automatic Aircraft parking, flight automatically senses the line and parking is done by line following sensors. Using these sensors the man power can be reduced. The working is explained as when the all the passengers leave from the flight it needs to park in separate place. We fix the parking mode buttons in flight. The number of parking mode buttons is equal to the number of parking slots in the airport. If we select the mode 2 the flight sense the particular way for the mode 2 parking area by using the LDR sensor. It skips the mode 1 way and parking slot. If any obstacles in that line the flight detect that obstacle by using the IR sensor. It stops the process and gives an alarm. The whole process is done controlled by the PIC16F877A. In this paper we will discuss the design, development, implementation and modification of a cost effective and efficient guidance system for commercial airplanes, this system is based on the microcontroller and sensors which guide the airplane throughout the ways between the parking area and the runway.
Keywords: Aircraft, Microcontroller, Sensor

I. INTRODUCTION

This paper explains the implantation of automation in aircraft parking system which is a step towards improving the parking methods. The aim of our paper is to design a system, for aircraft automatically parking. Parking is done the flight will give the buzzer by this sound we can confirmed that the fight is parked in correct position. It avoids the separate tow vehicles. This is very important advantage of this system. "Design and develop an automatic parking area for aircraft based on PIC16F877A, sensor technology and this way is having a man free operation". As the name suggests "Automatic Parking Area for Aircrafts" the key theme of our paper is Automation. So in very simple language the Automation means to replace the human being from the process with the machines. Means what presently the human is doing on the process now onwards the machines are going to do.

II. METHODOLOGY

The early and middle stage of 90's the aircraft parking is deals with truck and driver. The flight connected to the separate truck and the driver drove the truck and the truck tow the flight and drop into the correct parking position. The end of 90's same procedure is followed with one upgrade method. It reduces the driver to drive the truck. By using the remote the truck was operated. In this century the truck modified as a robot. The robot operates the truck. But here we are going to see the human less parking method.

The following functions are carried out when the aircraft lands.

- ✈ Selection of the mode
- ✈ Senses the particular way for parking
- ✈ Senses any obstacle in the way
- ✈ Displays the every movement of Flight in LCD
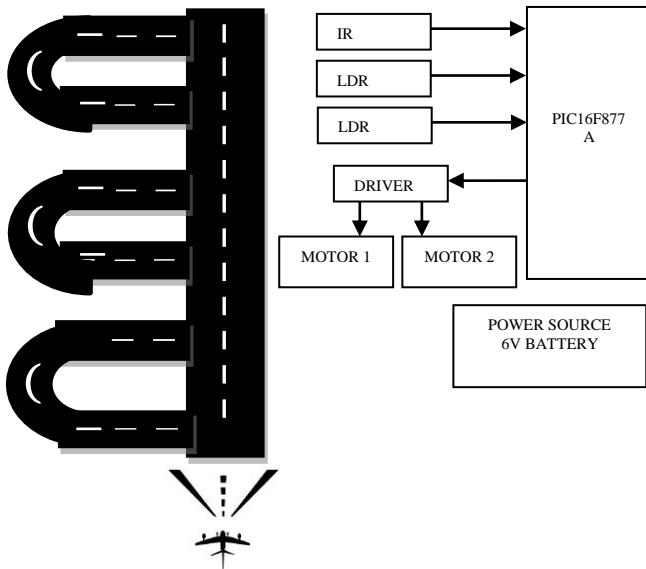- ✈ Give the Buzzer sound after the parking is done

Figure 1: (a) Flight parking Area (b) Block Diagram of the System

When passengers leave the flight, operator selects the mode and flight is going to parking area, it sense the particular way using LDR sensors, If any obstacles in way flight stop the movement and give the alert the obstacle is cleared the flight restart the work. Finally parking is done the buzzer sound comes. The every movement displayed in Liquid crystal display.

III. HARDWARE DESCRIPTION

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in UK) to a safer low voltage.

A bridge rectifier can be made using four individual diodes, but it is also available in special packages containing the four diodes required. It is called a full-wave rectifier because it uses the entire AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses 0.7V when conducting and there are always two diodes conducting. Infrared radiation (IR) is electromagnetic radiation with a wavelength between 0.7 and 300 micrometers which equates to a frequency range between approximately 1 and 430 THz. Infrared Senses any object in its line of focus, and sends alert, if detected an object.

A. Battery

Decomposition of the Electrolyte Cells with gelled electrolyte are prone to deterioration of the electrolyte and unexpected failure. Such cells are commonly used for emergency applications such as UPS back up in case of loss of mains power. So as not to be caught unawares by an unreliable battery in an emergency situation, it is advisable to incorporate some form of regular self test into the battery.

B. Discharge

During discharge, the lead dioxide (positive plate) and lead (negative plate) react with the electrolyte of sulphuric acid to create lead sulphate, water and energy.

C. Charge

During charging, the cycle is reversed: the lead sulphate and water are electro-chemically converted to lead, lead oxide and sulphuric acid by an external electrical charging source. Many new competitive cell chemistries are being developed to meet the requirements of the auto industry for EV and HEV applications.

IV. SYSTEM ARCHITECTURE

The PIC architecture is characterized by the following features:

- ✈ Separate code and data spaces (Harvard architecture) for devices other than PIC32, which has a Von Neumann architecture.
- ✈ A small number of fixed length instructions

- Most instructions are single cycle execution (2 clock cycles), with one delay cycle on branches and skips
- One accumulator (W0), the use of which (as source operand) is implied (i.e. is not encoded in the opcode)
- All RAM locations function as registers as both source and/or destination of math and other functions.
- A hardware stack for storing return addresses
- A fairly small amount of addressable data space (typically 256 bytes), extended through banking
- Data space mapped CPU, port, and peripheral registers
- The program counter is also mapped into the data space and writable (this is used to implement indirect jumps).

There is no distinction between memory space and register space because the RAM serves the job of both memory and registers, and the RAM is usually just referred to as the register file or simply as the registers.

A. Working Principle

It is relatively easy to understand the basics of how an LDR works without delving into complicated explanations. It is first necessary to understand that an electrical current consists of the movement of electrons within a material. Good conductors have a large number of free electrons that can drift in a given direction under the action of a potential difference. Insulators with a high resistance have very few free electrons, and therefore it is hard to make them move and hence a current to flow.

An LDR or photo resistor is made any semiconductor material with a high resistance. It has a high resistance because there are very few electrons that are free and able to move - the vast majority of the electrons are locked into the crystal lattice and unable to move. Therefore in this state there is a high LDR resistance. As the light falls on the semiconductor, the light photons are absorbed by the semiconductor lattice and some of their energy is transferred to the electrons. This gives some of them sufficient energy to break free from the crystal lattice so that they can then conduct electricity. This results is lowering of the resistance of the semiconductor and hence the overall LDR resistance. The process is progressive, and as more light shines on the LDR semiconductor, so more electrons are released to conduct electricity and the resistance falls further.

LDRs are very useful components that can be used for a variety of light sensing applications. As the LDR resistance varies over such a wide range, they are particularly useful, and there are many LDR circuits available.

B. Circuit Description

The circuit consists of power supply, Battery, IR sensor, LINE detecting LDR sensor and dc motor. The input given to the power supply is 230 volt AC power. That power supply board step down that as a 5 volt dc power, because PIC16F877A works in 5 volt dc power.

The model Aircraft runs by DC motor. First we need to trigger the circuit, and the operator selects the parking mode by using the switch. When we select the mode the aircraft moves on the line for the particular mode by using the LDR line detecting Sensors we fix the LDR and LED near by the aircraft wheel and left or right side wings. When we select the parking mode LED glow, LDR sense that light power. The Light fall on black line LDR gets low power so circuit consider this is a correct path. If Light falls in other sides it automatically decides this not a correct path. If any obstacles in path by using the IR sensor the Flight detects that obstacle and it automatically stop the functions and it will buzzer. Obstacle is cleared then the flight restarts the work. And it goes to the correct parking place and the buzzer sound will come when it completes its work. All the movements of the Aircraft is displayed on LCD display. All these operations are controlled by PIC16F877A microcontroller.

C. Advantages

- Avoidance of tow truck
- eliminating its cost of operation & Maintenance
- man less operation
- Elimination of human prone error,
- Increasing the level of safety.
- Simple & more effective.

D. Limitations

i. The installation period and the initial cost of setup is high.

ii. Due to single entry and exit point there will be a deadlock situation if several vehicles arrive

simultaneously.

V. CONCLUSION

The automated aircraft parking system is the best solution for the modern day parking system, by eliminating the tow truck & man power thereby making it cost efficient. In our paper we have introduced the techniques such as Infrared Sensing & LDR sensing to detect path for aircraft's parking as well as detecting any obstacles in its way. By effectively using these techniques aircraft can be parked in an effective way than the present day technique.

VI. REFERENCES

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