RFID Tag. The categories of RFID, the active type, passive type, and half-active type, respectively. An active tag uses its internal power source to supply energy without the need of acquiring power from RFID reader to initialize. Active tags can communicate with readers 10 meters to 100 meters or more away. Passive tags have no power source of their own. Passive tags generally operate at a maximum distance of 3 meters or less, and have power only when in communication with an RFID reader. Undoubtedly, industrial automation application is one of the key issues in developing RFID. The utilization of RFID technology is novel and might enhance the existed automation system. A RFID-based autonomous mobile robot is designed and implemented in this paper for more extensively application of RFID systems. The ARM Microcontroller of Microchip LPC 2148 is used to control the proposed autonomous mobile robot and to communicate with RFID reader. Due to the uniqueness of RFID tag, the moving control commands such as turn right, turn left, speed up and speed down etc. The autonomous mobile robot can read the moving control commands from the tags and accomplish the proper actions.

II. EXISTING TECHNOLOGY AND PROBLEM

Unlike bar codes, no clear line of sight is required to obtain an accurate read. The basic RFID system comprises a transponder, a reader and an antenna. Data is stored in a transponder device called a tag. Current tags, depending on application, can hold up to 2 kbits of data. Tags can be read-only or

IJAERS/Vol. 1/ Issue 1/October-December, 2011/163-166
read/write. The transponder memory may comprise read-only (ROM), random access (RAM) and non-volatile programmable memory for data storage depending upon the type and sophistication of the device. The existing microcontroller used is the PIC 18F4550 microcontroller is used to control the autonomous mobile car and to communicate with RFID reader[1]. By storing the moving control command such as turn right, turn left the autonomous mobile car can accomplish the proper action. The ROM-based memory is used to accommodate security data and the transponder operating system instructions which, in conjunction with the processor or processing logic deals with the internal “house-keeping” functions such as response delay timing, data flow control and power supply switching.

III. PROPOSED WORK
Undoubtedly, industrial automation application is one of the key issues in developing RFID. The utilization of RFID technology is novel and might enhance the existed automation system. A RFID-based autonomous mobile robot is designed and implemented in this paper for more extensively application of RFID systems. The ARM Microcontroller of Microchip LPC 2148 is used to control the proposed autonomous mobile robot and to communicate with RFID reader. Due to the uniqueness of RFID tag, the moving control commands such as turn right, turn left, speed up and speed down etc. The autonomous mobile robot can read the moving control commands from the tags and accomplish the proper actions. The novel localization system for an indoor mobile robot is proposed to improve the efficiency of mobile robot system.

The RAM-based memory is used to facilitate temporary data storage during transponder interrogation and response.
1. The Antenna is a coil of wound copper wire designed specifically to emit RFID signals.
2. The Reader Unit powers the coil of wire known as the antenna, filters and powers them for transmission over distance
3. The Transponder (Tag) a memory device, usually EEPROM, programmed with a series of bits.
4. The Interface unit interfaces the reader to an intelligent device (Ex: Microcontrollers, ARM Processors)

IV. ARCHITECTURE AND DESCRIPTION FOR DESIGNED SYSTEM
The basic RFID system comprises a transponder, reader and an antenna. Data is stored in a transponder device called a tag. Current tags, depending on application, can hold up to 2 kbits of data. Tags can be read-only or read/write.

1. RFID Tags (transponder)
Consists of a microchip and an antenna. Attached to an object to be tracked (vary in size) Stores information about the object Read/Write or Read Only. Contact less, line of sight not required. Read Range: few inches if passive to hundreds of feet if active.

2. RFID Reader (interrogator)
It is used to power up the tag. It established bidirectional data link. It can communicate with network server. Inventory tags and filter results. It can read 100 to 300 tags per tag. These readers can be fixed or mobile type.
A typical reader generally has following parts
1. Digital Signal Processor.
3. Following Radio modules
   - 915MHz
   - 13.56MHz
   - 125KHz

The below shown is the probable PCB mounted diagram of typical RFID reader for understanding purpose. There are two processors these are DSP and N/W processors. DSP deals with the radio frequency signals. The other circuitry is also shown in the diagram. There is a coil antenna which is quit big in size with other components. This antenna is used for radio wave transmission.
There are also four pin outs as follows:
1. VCC: This is for providing required voltage to circuit.
2. GND: For grounding purpose.
4. En: This is kept at ground level.
RFID systems operate according to one of two basic procedures: full duplex (FDX)/ half duplex (HDX) systems, and sequential systems (SEQ). Full Duplex and Half Duplex Transponder sends during energy transmission. Techniques needed to detect weak signals from tags Sequential tag sends its data when the reader is turned off Battery supply is required to send the data. Low Frequency Applications: Security access, Animal identification, Asset tracking High Frequency Applications: Smart Cards, Access Control Ultra High Frequency Applications: Railroads, Vehicle Identification, and Transportation.

There are many different versions of RFID that operate at different radio frequencies. Three primary frequency bands have been allocated for RFID

1. Low Frequency (125/134 KHz) – Most commonly used for access control and asset tracking.
2. Mid-Frequency (13.56 MHz) – Used where medium data rate and read ranges are required.
3. Ultra High-Frequency (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) – offer the longest read ranges and high reading speeds.

For example, while the robot moves to tag 1 and receives the commands of turn left and speed up, then the MCU will make some control actions to let the robot conform the commands. While the robot moves to tag 2, the commands of go straight and slow down were received, the MCU will once again make some control actions to let the robot conform the commands. Therefore, the robot will then move in moving path 1 automatically[1]. Of course, the robot can also move in the other paths according to the commands received from tags. Fig. 5 shows the physical hardware of the proposed RFID-based autonomous mobile robot. An RFID reader (antenna) has been installed to read the tag data on the bottom of the mobile robot. If the robot moves and stays on any tag, the RFID reader reads the coordinate value of RFID tags on the floor to localize the mobile robot.

V.OBJECT TRACKING AND IDENTIFICATION ALGORITHM

An algorithm has been developed to avoid collision with other objects. Any other operation such as navigation, object identification will not override above condition. It will make sure that the robot will not contact with objects in the field at any time[2]. Always the IR sensor array scan the surrounding field to verify weather the robot is going closer than desired limits. If at least one sensor is activated the control system will decide the next action to be executed according to the given instructions and constraints.

The robot can be configured according to the field conditions. The data about the field quantities can be fed into the micro-controller based intelligent control system by simply uploading the data file. The robot starts its navigation by rotating the ultrasonic sensor panel with respect to a reference location as shown in Fig. 6. The tolerance angle of the object capture line is demonstrated in Fig. 7.
The intelligent control system then keeps the object locations along the rotating angle. After rotating 90 degrees clockwise, the sensor panel is taken back to the original starting position. Then the same scanning procedure is obtained to read data while rotating 90 degrees in clockwise direction. In the total scanning process, the direction with respect to starting position and sensing distances are recorded.

After scanning a semi circle the control system will manipulate algorithm methods to analyze the type of objects detected. In this first attempt, the robot will distinguish solid objects from obstacles like walls. But in this attempt the robot may not be able to identify the type of separate object. Then the robot has rough idea about the front semi circle scanned. According to the application, the scanning range (The rotating angle range and sensing distance range) can be changed. If it is required above scanning can be done in a single full circle scan. After the scan, the robot will rotate anti-clockwise to align with the first object position. Then the robot will go along the selected object. In this task, the ultrasonic sensor system will play the main role, to capture the object direction. Simultaneously the IR sensor array will scan the surrounding to make sure that no obstacles will be collided with the robot.

**Fig 8: Steps of Object Identification Process**

When the robot gets closer to the object, the robot will scan the outline shape of the solid object using IR sensor array. The scanning is done by traveling around the object as illustrated in Fig. 8. Since this machine is capable only to identify pre defined objects, the robot can compare the scan results with the stored information.

The robot can identify pre-defined objects by searching the database. If it cannot identify the object, it will execute the object identification algorithm again. If the robot fails again, it indicates that the object is not in the set of predefined objects.

**VI. CONCLUSIONS**

A novel RFID-based robot navigation system is proposed in this paper. The proposed algorithm is very modular as it can be easily implemented on virtually any type of robotic systems and working environments. This prototype can be used effectively in the real time world like in the industries for transportation of good from the working place to the go downs. The can a feedback circuit used in this such as the logic used in path following robot so that if the robot makes any wrong in detecting the RFID tags this helps in directing the robot. The selection of the wheels must be apt according to the environment where the robot moves. These wheels can be replaced by the legs using the advanced technologies. Thus, the project on the navigation mobile robot is successfully implemented in the predefined environment. The future scope of this project on the navigational mobile robot using RFID can be extended using the chipless RFID tags, multiple RFID tags, GSM, ZIGBEE technologies. The drawback of knowing the unknown environment can be cross over using the above proposed technologies.

**REFERENCES**