Smart Robotic Bin on Wheels

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ABSTRACT: The robotic bin moves on its own to catch the object. Here we are placing the basket on robot to catch the object. A High efficient camera is attached to the robot which is used to track the object. In this we are using Intel Atom Processor for which camera is interfaced. This camera captures the object and the processor decides the path of object and moves the robot in that direction to catch the thrown object. For the movement of robot a wheel mechanism is used. This mechanism helps to move the robot in the direction of object and with the angle at which object lands. Hence the object directly catches by the robot into the basket. Since this project is done by Japanese and now we took the first step to implement this project. The advantages of this project are it is very useful for handicaps and if any valuable object is to be fallen suddenly this robot catcher will be very useful for it.

I. INTRODUCTION

A robot can be defined as a programmable, self-controlled device consisting of electronic, electrical, or mechanical units. More generally, it is a machine that functions in place of a living agent. Robots are especially desirable for certain work functions because, unlike humans, they never get tired; they can work in physical conditions that are uncomfortable or even dangerous; they can operate in airless conditions; they do not get bored by repetition; and they cannot be distracted from the task at hand.

Project overview:

The objective of the project is to catch the object, by placing a basket on the robot to catch the object. The project is constructed by INTEL ATOM PROCESSOR, 8051 Atmel micro-controller etc. If any object falls suddenly whether it is a precious or delicate object we may lost that object. This system is also helpful for aged and handicap people.

II. BLOCK DIAGRAM

Fig. 1 shows the block diagram of the ROBOTIC DUSTBIN with various modules. Each of these modules is described in this section.

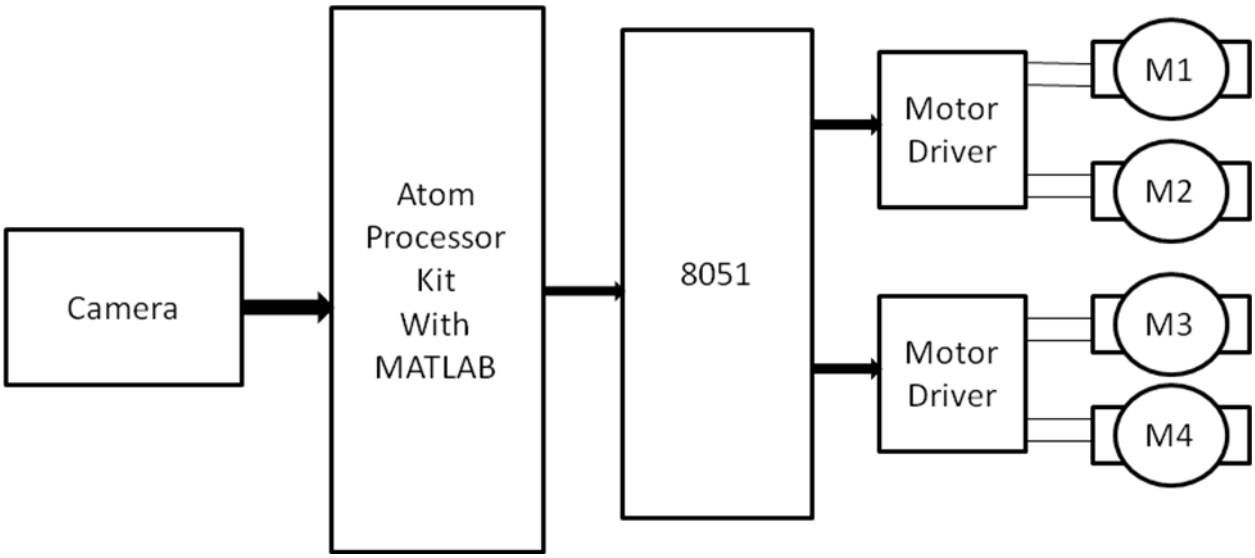

Fig. 1 Block Diagram of Robot Catcher

III. DESCRIPTION

CAMERA

If a camera is mounted on your robot, this can be used to track colour objects such as Red Balls, track motion, track human faces, watch television, or simply view the camera image. The brightness of the detected coloured object can be adjusted manually to remove any false positives. Test in a bright room with the desired coloured object and adjust the brightness until only that object is detected. Computer vision is an advanced technology which requires a bright room without shadows. Computer vision is a very experimental technology, and therefore requires a clean and bright environment to accurately detect objects and colours.

Fig: 2: Camera

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The Configure menu also has many options for servo and movement tracking ability. If servo tracking is checked, the control assumes the camera is mounted on the specified servo. The servo will be moved from left, right, up and down to track the coloured object.

If Movement Panel Control is checked the robot will follow the object when it is visible. The robot will move forward, left or right to follow the desired object.

When tracking Glyph images, the glyph will only execute its respective tracking script once until another glyph has been detected.

A tracking type is the function of what to track. For example, to track the colour RED, you would only select the Colour tracking type. Each tracking type has configuration settings which are on their own tabs. If you have COLOR checked as a tracking type, then the configuration for the COLOR tracking type is in the tab labelled COLOR.

Select one or more of the types of tracking methods to detect. If this is your first time, start with only one at a time to learn how they work. Rarely will you track more than one type at once. Here is a summary of the tracking types…….

Colour: This will track the specified colour from the COLOR tab. The colour can be selected between Red, Green or Blue. The Colour tab will also give you settings to adjust the brightness and size of the object. Hold the object in front of the camera while changing the settings.

Motion: This observes changes within the camera image. Motion should not be confused with the "Movement" Setting from the configuration menu, as they are different things and should not be used together. The Motion Tracking Type will detect a change in the camera image and return the area of the change. For example, if your camera is stationary and you wave your hand in a small area of the camera image, you will see the motion display of your hand moving. If the entire robot moves during Motion Tracking Type, the entire image would have been considered changed and that is not useful for tracking. So, Motion Tracking Type is only used

INTEL ATOM PROCESSOR

Intel Atom is the brand name for a line of ultra-low-voltage IA-32 and x86-64 CPUs (or microprocessors) from Intel, originally designed in 45 nm complementary metal–oxide–semiconductor (CMOS) with subsequent models, codenamed *Cedar*, using a 32 nm process. Atom is mainly used in net books, net tops, embedded applications ranging from health care to advanced robotics, and mobile Internet devices (MIDs). Intel Atom is a direct successor of the Intel A100 and A110 low-power microprocessors (code-named Stealey), which were built on a 90 nm process, had 512 kb L2 cache and ran at 600 MHz/800 MHz with 3 W TDP (Thermal Design Power). Prior to the Silverthorne announcement, outside sources had speculated that Atom would compete with AMD's Geode system-on-a-chip processors, used by the One Laptop per Child (OLPC) project, and other cost and power sensitive applications for x86 processors. However, Intel revealed on 15 October 2007 that it was developing another

new mobile processor, codenamed Diamondville, for OLPC-type devices. "Atom" was the name under which Silverthorne would be sold, while the supporting chipset formerly code-named Menlow was called Centrino Atom.

AT89C51 MICROCONTROLLER

The AT89C51 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K Bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high density non-volatile memory technology and is compatible with the industry standard MCS-51™ instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

The AT89C51 provides the following standard features: 2K Bytes of Flash, 128bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The Power down Mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

The use of static memory allows the device to be operated at zero frequency. It also affords two software-selectable save power modes. Idle mode stops the CPU, retaining the contents of the internal RAM, allowing the timer/counter, interrupt system, and serial ports to function normally. Power-down saves the RAM contents but freezes the oscillator, disabling all other activity until the next hardware reset.

The amount of PEROM (programmable and erasable read-only memory) available on the AT89C2051 is sufficient for most applications, including use in portable instruments, supervisory-control applications, autonomous robots, and more. Use as controllers in portable instruments is further simplified by the low power consumption and wide operating voltage range.

The AT89C51 allows 15 bits of I/O, configured as 8 bits on port1 and 7 bits on port3. Port1 and port3 are compatible to the p1 and p3 on an 8051 (except port1.0 and port1.1).

Fig. 3: AT89C51 microcontroller chip

L293D MOTOR DRIVER

Fig. 4: Image of L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic

00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

DC MOTOR

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications. In our project we are using the brushed DC motors.

Fig. 5: Brushed DC motor

IV. REQUIREMENTS OF THE PROJECT

Hardware:

- INTEL ATOM PROCESSOR
- Camera
- 8051 Atmel micro-controller

- Omni Wheels 50mm
- L293DNE Motor Driver
- Motors

SOFTWARE:

Mat lab 2013b v

Keil Software

OMNI WHEELS

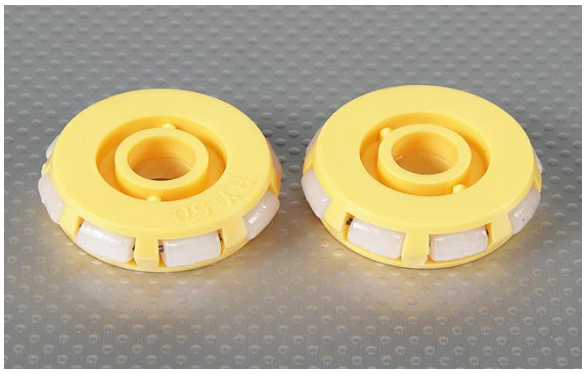

Fig. 6: Omni Wheels

This is Omni wheels from Dagu, similar to Mecanum wheels, are wheels with small discs around the circumference which are perpendicular to the rolling direction. The effect is that the wheel will roll with full force, but will also slide laterally with great ease.

Omni wheels or poly wheels, similar to Mecanum wheels, are wheels with small discs around the circumference which are perpendicular to the turning direction. The effect is that the wheel can be driven with full force, but will also slide laterally with great ease. These wheels are often employed in holonomic drive systems.

A platform employing three omni wheels in a triangular configuration is generally called Kiwi Drive. The Killough platform is similar; so named after Stephen Killough's work with omnidirectional platforms at Oak Ridge National Laboratory. Killough's 1994 design used pairs of wheels mounted in cages at right angles to each other and thereby achieved holonomic movement without using true omni wheels.

Omni wheels combined with conventional wheels provide interesting performance properties, such as on a six wheel vehicle employing two conventional wheels on a centre axle and four Omni wheels on front and rear axles.

Although Omni wheels are capable of movement in many directions, they are not true omni-directional wheels, a classification reserved for spherical wheels such as ball transfer units.

KEIL SOFTWARE

Software Description:

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all 8051 derivatives and help you get your projects completed on schedule.

From the C program to the machine language:

The C source code is very high level language, meaning that it is far from being at the base level of the machine language that can be executed by a processor. This machine language is basically just zero's and one's and is written in Hexadecimal format, that why they are called HEX files.

There are several types of HEX files; we are going to produce machine code in the INTEL HEX-80 format, since this is the output of the KEIL IDE that we are going to use. Fig 4.1 shows that to convert a C program to machine language, it takes several steps depending on the tool you are using, however, the main idea is to produce a HEX file at the end. This HEX file will be then used by the 'burner' to write every byte of data at the appropriate place in the EEPROM of the 89S52.

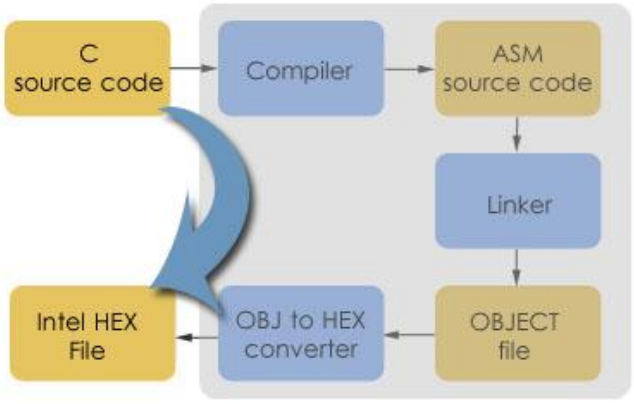

Fig. 7: Block Diagram of Keil software programming

MATLAB

The name MATLAB stands for Matrix Laboratory. MATLAB was written originally to provide easy access to matrix software developed by the LINPACK (linear system package) and EISPACK (Eigen system MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming environment. Furthermore, MATLAB is a modern programming language environment: it has sophisticated

data structures, contains built-in editing and debugging tools, and supports object-oriented programming. These factors make MATLAB an excellent tool for teaching and research. MATLAB has many advantages compared to conventional computer languages (e.g., C, FORTRAN) for solving technical problems. MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. The software package has been commercially available since 1984 and is now considered as a standard tool at most universities and industries worldwide. It has powerful built-in routines that enable a very wide variety of computations. It also has easy to use graphics commands that make the visualization of results immediately available. Specific applications are collected in packages referred to as toolbox. There are toolboxes for signal processing, symbolic computation, control theory, simulation, optimization, and several other fields of applied science and engineering package projects.

V. RESULT

Fig. 7: Experiment Result

VI. CONCLUSION

Robotic dustbin would be one of the famous robo which catches the fallen object and in which camera is inserted to catch the object. It is very useful for handicapped people and senior citizens who are not able to move. When a valuable or precious object falls or slips from others hand in the presence of this robo, it helps to protect the object from falling down.

VII. REFERENCES

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