Internet of Things (IoT) Based Robotic Arm

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***Abstract* - The ongoing revolution of Internet of Things (IoT), together with the growing diffusion of robots in many activities of everyday life, makes IoT-aided robotics applications a tangible reality of our upcoming future. Accordingly, new advanced services, based on the interplay between robots and things, are being conceived in assisting humans. Nevertheless, the path to a mature development of IoT-aided robotics applications requires several pivotal issues to be solved, design methodologies to be consolidated, and strong architectural choices to be discussed. As Robots are used to help mankind in various environments if we combine the Robots and Internet of things we can achieve more than we can think of. This project discusses technological implications, open issues, and target applications in the IoT-aided robotics domain.**

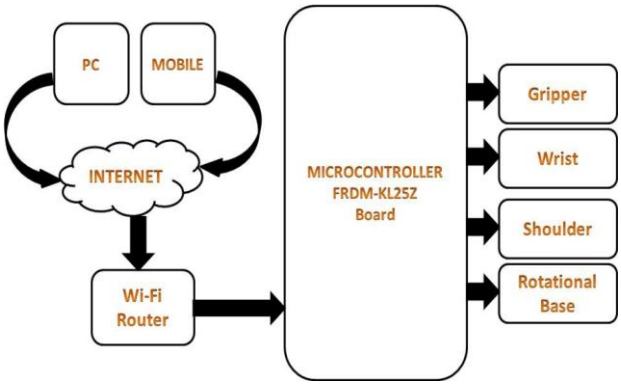
I. INTRODUCTION

For the people who are indulged in electronics either as a hobby or as a profession who kind off happens to have more interest in robotics this project is the key in which most of precise work which humans cannot do repeatedly, this is where a robotic arm or we can say a pick n place robot comes into picture. Robotics is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing.

A Robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a anipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement.

The internet of things (IoT) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.

II. BLOCK DIAGRAM AND DESCRIPTION



III. DESCRIPTION:

The main part of the project is the robotic arm, which can pick and place things from one place to another. To control this action we can move the robotic arm by giving specific commands. The robotic arm is equipped with servo motors. These motors help to move the arm in desired direction. The motors are controlled with the help of a micro controller. The user interface which is used to control the robotic arm is made on a web page or an app. The control is given via the internet to the wifi router. This acts as the receiver and gives the received signal to the microcontroller. The microcontroller will act as per the given instructions and display the related message on the LCD display. The signal which is given to the robotic arm is actually sent through the internet and hence we can access the robot from any place. However the web page or the app must require a login ID and a password for security reasons, for a person to control the robotic arm. The movements which are made by the robotic arm can be recorded and saved. In this way the arm can do the same movements repeatedly.

IV. IOT(Internet Of Things):

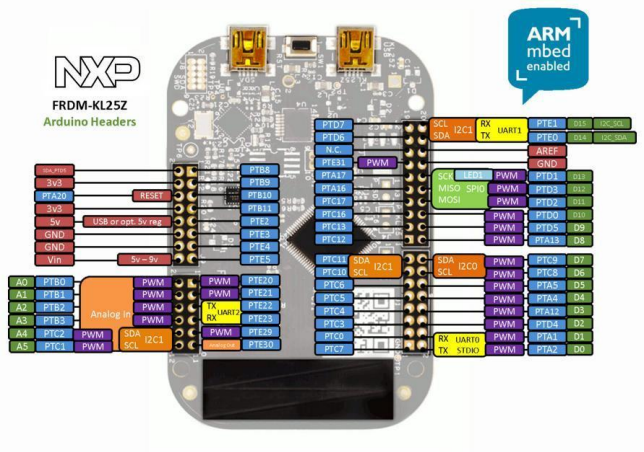
The Internet of things (IoT) is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.

Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine- to-machine (M2M) communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to the areas such as smart cities.

"Things" in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist firefighters in search and rescue operations.

V. FRDM KL25Z BOARD

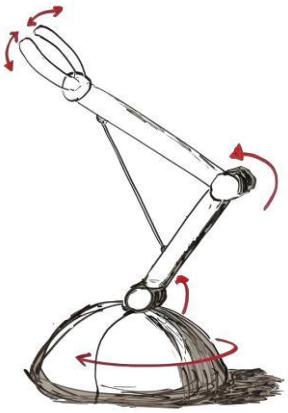
The Freedom KL25Z is an ultra-low-cost development platform for Kinetis® L Series KL1x (KL14/15) and KL2x (KL24/25) MCUs built on ARM® Cortex®-M0+ processor. Features include easy access to MCU I/O, battery-ready, low-power operation, a standard-based form factor with expansion board options and a built-in debug interface for flash programming and run-control. The FRDM-KL25Z is supported by a range of NXP® and third-party development software. You can now use mbed.org at no charge, with full access to the online SDK, tools, reusable code which means no downloads, installations or licenses and an active



community of developers. Processor Expert® component for low voltage H-Bridge products enables rapid embedded application development.

VI. ROBOTIC ARM

It integrates mechanical, electrical, electronics, control engineering, computer science, technology, math and science.Robots are indispensable in many manufacturing industries.



More than this, once programmed, robots repeatedly perform functions with a high accuracy that surpasses that of the most experienced human operator.

The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement.[1][2] The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand.

There are several types of robot arms. The most flexible design is articulated and has between four and six axes. Articulated robot models boast a variety of work envelope sizes and maximum payload capacities. Tooling is attached to the end of the robot arm to move, position, and otherwise manipulate a part. The work envelope is the area a robot arm can reach within its normal range of motions. Maximum payload is the highest amount of weight a robot arm can safely carry and manipulate. It includes the weight of any additions to the robot arm, including the tooling.

VII. ADVANTAGES:

[1]. Lifting and moving heavy objects.
[2]. Increasing productivity, safety, efficiency, and quality of products.

[3]. Achieving more accuracy than human beings.
[4]. Easy to monitor and control things.

VIII. DISADVANTAGES:

[1]. The robot lack capabilities to respond in emergencies.
[2]. Losing security and privacy.

IX. APPLICATIONS:

[1]. Industrial application – pick and place.
[2]. Third hand – The arm holds the object while operators work on it.
[3]. Small drill in manufacturing processes.

X. FUTURE SCOPE:

[1]. Medical Field where minor surgeries are required.
[2]. Retrieving Suspicious objects without endangering humans.

XI. REFERENCES:

[1] https://en.wikipedia.org/wiki/Robotics
[2] https://en.wikipedia.org/wiki/Internet_of_things
[3] https://en.wikipedia.org/wiki/Robotics
[4] https://en.wikipedia.org/wiki/Robotic_arm
[5] http://home.iitk.ac.in/~adutta/Manual_serial_arm.pdf
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