Elementary particles

Elementary particles Elementary Particles are the smallest building units in our Universe and one of the most controversial topics in our age.It seems like a big secret and even scientists from all over the world are not able to tell you the entire concept behind this system. There are still a lot of open questions, which shows the discovery of a new particle in July 2012. I want to try to explain the basic parts of the system. In our fast world today everyone concentrates on different topics and worries about many things like,different new materials and about their possible risks.Everyone use a Laptop, a phone and drives a car, but have you ever questioned yourself about the background of all these materials? All around us consists of matter in four phases: solid, liquid, gas and plasma phase. The second form of matter is field., where four different forms of fields are observed. The gravitational and electromagnetic field, which are well known from phenomena around us. The other two occur in the world of atoms and are called nuclear fields.They differ in their intensity of the field and there is a weak and a strong nuclear field. The corpuscular form of matter consists of two groups of fundamental particles. First group contains leptons and the second group contains quarks, but there is also another new particle which was explored in July 2012 in Switzerland in the Cern,named Higgs Boson. These three particles form the standard model of the elementary particle physics, which describes the interaction between these particles. In current understanding , particles are excitations of quantum fields and interact following their dynamics. This standard model contains of 24 fundamental particles, The Higgs-boson, which is also a part of the system should be neglected, because it needs still a lot of research to understand these particle. The Leptons are not interconnecting with the strong nuclear force and there are three generations of these particles. The first one involves electron and electron neutrino, the second one muon and muon neutrino and the third consists of particle T and tau neutrino.Every Lepton group has also an antiparticle and if you want to generate a anti lepton, you have to generate a lepton too, or you can destroy a anti particle. This ensures a constant potential of the Lepton. Anti particles have the same mass, identical value of spin, but opposite rotation and opposite magnetic moment. The generations of quarks differs according to the property called flavor. This flavor has nothing to do with a real color. There is the color red, green and blue. If three Quarks with the same color come together the particle is colorless. The colors are used for the observing of the particles and are just synonyms for a observed particle. There are quarks u (up) and d (down), which occurs in the first generation. The second one is composed of s (strange) c (charm). The third generation is composed of b (bottom) and t (top) . All generations vary in non integer charge.Quarks are components of the hadrons, which are building units of the protons and neutrons. Hadrons have to fulfill two conditions, their electric charge must be integer and their combination must be colorless. This situation can be achieved in by two different ways. Hadrons of the first group are composed of two quarks, quark and antiquark, which are called mesons. They have an integer value of spin. The second group of Hadrons are called baryons and they are composed of three different quarks different color.For example a proton is formed by two quarks u and one quark d, a neutron by two quarks d and one quark u.The difference between the leptons is, that quarks are liable to the fundamental forces of physics. They are subjected to strong and weak interactions, electromagnetic interactions and gravitation. Each of these elementary particles interacts with other elementary particles, through one or more forces.The electromagnetic force (between particles with electric charge), the strong force (between particles with color charge, such as the quarks), the weak force (between all leptons and quarks), and the gravitational force (between all particles). These forces are mediated by yet another set of elementary particles, the gauge bosons: When two particles interact, they exchange one or more gauge bosons. The gauge bosons include the W and Z bosons, which mediate the weak nuclear force, the gluon, which mediates the strong nuclear force, and the photon, which mediates the electromagnetic force.Whether these particles might themselves be composed of more fundamental building blocks is an open question, and the construction of a "theory of everything" that would explain the properties of all of the known particles and forces remains the ultimate goal for modern physics. Finally there are a lot of complex relations in this system and it would take a few more pages to describe all interactions.

sources: Frantisek Vitek- Lectures on Biophysics with Medical Orientation

http://en.wikipedia.org/wiki/Elementary_particle