BotBall-Paper

Team: *Team Project*
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Theme: Robotics for Sustainable Agriculture

Robots continue to develop every year, new functions and applications surprise the society every time again.
One of the main theme in the last years is the production of food and the effects of the food production. In such times, there is much thinking about how robots could make the production more environmentally friendly.

Introduction

The production of food needs to rise about 60% in the next years because of the increasing population of the earth. Because of that we need to think about ways how we can produce more environmentally friendly and quicker.

Problems due to/in the/food production

I.   *Rise oft he human population*
      Due to the rise of human population, which will reach about 2 Billion humans till the year 2050, the demand for food will continue to increase. To satisfy this demand many products are crafted in mass production. Because of this type of production, the quality of the food often loses in value.

II.   *Large-scale livestock farming*
      To save money and expense large-scale livestock farming is operated. In these farms animals aren't treaded equitable right. The basic needs of the animals are ignored and the freedom to move is limited.
      To guarantee that the animals survive this unfair form of farming they are being given medical treatment with antibiotics. But this also brings risk to the human health because in the end we eat the meat of these animals and also intake the medical substances left in the meat.

III. *Price raising*
      The prices of the nourishments rise dramatically. Due to this rise many humans, mainly in poor regions, can't even afford food anymore.
      In recent statistics of the UNO about a Billion people around the globe are malnourished. This is around 12,5 percent of the whole population of the world.

IV.   *Industrial growth*
      Because of the vigorous increase of the production there is more and more industry. The industrial zones are getting more clustered and are growing more and more due to this there are further fumes and garbage which burden the environment. The garbage of the industry is often not correctly disposed and is ecologically harmful thrown away.

V.   *Ecological harm due to the industry*
      Because the industry needs lots of electricity the production of this energy will be rising. But around the world not every power plant uses renewable commodity. Currently nearly everywhere nuclear energy is the main source of electricity although water energy-, solar energy-, and wind energy plants are way more ecological friendly. Coal is also often used as an energy source. Unfortunately, coal is not renewable and it won't be available in the future.

VI.   *Breeding with chemical aid*
      At the growth of vegetables often chemical aid is used to fertilize and to save the vegetables from insects. This aid is harming the vegetables, the environment and the animals that live in this environment. In addition, the vegetables are being breed so that there are nearly no nutrients in them.

Replacing the human with machines

What often gains the attraction is that more and more humans, mainly in the industry are being replaced by machines.

- **Advantages:**

I. *Time saving*
Through the stake of machines the time needed for the production is cut essentially.
Machines are not getting tired and are working according to chosen settings. Due to this the performance remains steady.
It can be precisely estimated in how many products are being produced in which time.

II. *Money saving*
Robots are a onetime purchase and maybe they need to be repaired a few times.
But these costs are way cheaper than the costs of many labourers which would do the same work in a longer period.

III. *More efficient*
The work of Robots is predictive way more efficient then the work of humans in the same period.

IV. *More precise*
The work of a Robot is way more precise then the work of a human.
In the manufacturing of same products that look the same robots can be set on specific settings.

V. *Saving of labourers*
To operate a robot often only one person is needed to do this. A lot of times this robot finishes the work of several humans simultaneously.
Therefor the machine substitutes the work of many labourers. This is in the sight of a company an advantage.

- **Disadvantages**:

I. *People lose their jobs*
Using machines, more and more people are losing their jobs. Especially people, who have been working for a long time in industry and have already reached a certain age, will not find a job after dismissal that easy.

II. *Need current to work*
Without electricity, the machine cannot work effectively. As already mentioned, this is usually not produced in an environmentally friendly manner, so the working of machines is not as environmentally friendly as working human beings.

III. *Not fail-safe*
By the above-mentioned point, is working of machines not fail-safe. If the power fails, or the machine has an error, then is it unable to continue working. Large errors can lead to longer production gaps.

Suggestions for the improvement **and promotion of agriculture**

Here are some points, which are important to implement in the agriculture.

By implementing these things, agriculture can be operated much more considerate and environmentally friendly.

The environment will not be stimulated so much and can avoid harming.

Robot with renewable energy

An important aspect is, that all the robots in agriculture, regardless of whether harvest robot or robot, which can scatter the seeds, are operated with renewable energy. The use of non-renewable energy, such as coals or oils, is very harmful for the environment and requires many resources that will go out of humanity in a certain time. The benefit of solar power, hydro power or even wind power would protect the environment and reduce the impact of the environment. The resources will not go out and can easily drive a harvesting machine by some processing.

I. *Automatic movement of a harvesting field/General automation of the harvesting machine*

Likewise, it would be very useful to let the robot move off a field automatically. This can be done by programming without any problems. Likewise, the machine should recognize if the storage for the harvested materials is full. If it is full, the machine should return and place the contents in a desired place. After the materials have been laid down, the harvest can be passed on without problems. If there are any problems in this implementation, the robot will make loud noises and let the owner know that something is wrong.

II. *Check of the fertilizer*

It is very important to always check the fertilizer, which is used to sprinkle the crop, beforehand. This should be secured by a specialist or an employee, thus should be prevented, that chemical fertilizer will not do damage to the crop and environment.

Design

The robot/machine should be produces as environmentally friendly as possible. Only material that are necessary should be used.

The team agreed that it would be useful to use solar energy. Thus, the robot should be equipped with as many solar cells as possible, with this can the robot store a lot of energy during the day and then do his work. If this is not possible, the machine can also be charged with electricity, but this electricity should be collected from a water or wind power station.

Conclusion

It is very important to pay attention to its environment, also the production of food has increased very strongly. That's why you should think about how to make production more environmentally friendly and fair. With this paper, we showed some problems that exist now in the world, the wrong treatment of living beings or the poor treatment of nature are standing in the foreground. Unfortunately, we cannot change the minds of some people, but we hope that these little ideas can be useful, and might make the world a better place.