Development of autonomous unmanned helicopter based agricultural remote sensing system

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Abstract: Remote sensing (RS) is a very promising data collection tool for precision agriculture and has been widely used for many decades. However, the relative low spatial and temporal resolution are the major drawbacks for traditional RS platforms (such as satellites and piloted aircrafts). This study discusses the development of agricultural remote sensing system using autonomous unmanned helicopter to acquire the crop field image at the right time and right place with high image resolution. The helicopter was equipped with a global positioning system (GPS), an inertial measurement units (IMU) and a geomagnetic sensor to detect the position, attitude and velocity of the helicopter. An autonomous controller was used to control helicopter to reach desired positions. A multi-spectral camera was mounted on the helicopter using a pan/tilt platform which can adjust the camera posture according to attitude of the helicopter to avoid the image distortion. A ground station computer was used to communicate with the helicopter in real-time to monitor flight parameters and send out control command. The images captured from this system are suitable for multi-purpose agricultural RS research.
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